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## PATENT SPECIFICATION



Application Date: Dec. 14, 1932. No. 35,459/32.

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## PROVISIONAL SPECIFICATION.

No. 35,459, A.D. 1932.

## Improvements in and relating to the Control of Colour Lighting Apparatus.

We, HOLOPHANE LIMITED, a company organised and existing under the laws of Great Britain and Ireland, and ROLLO GILLESPIE WILLIAMS, a British subject, both of Holophane House, Elverton Street, Vincent Square, London, S.W.1, do hereby declare the nature of this invention to be as follows:—

This invention relates to the control of colour lighting systems. A system is known in which the complete installation, that is to say a number of sets of equipment each comprising two, three or more colours and each located at a different point, for example to illuminate the ceiling, walls and proscenium cove respectively of a theatre, is controlled by a motor driven drum switch whereby the colour lighting goes through a cycle of predetermined changes during one rotation of the drum, which may take about seven minutes. Each set of equipment comprises lamps with colour filters and in some cases unfiltered lamps as well and the desired colours are obtained by controlling the lamps through dimming resistances.

In the case say of a theatre where large sets of equipment and heavy currents are involved, the dimmers are actuated by reversible electric motors and the motors themselves are controlled by electrically operated contactors, each motor requiring two contactors, one for each direction of rotation. In this case the drum switch comprises a pair of cam plates for each motor which actuate the respective contactors and for the complete installation there will be a large number of plates on the drum, for example, with four three-colour sets of equipment there will be twenty four plates and the sequence of colours, though it can be designed as desired, is definitely fixed once the drum has been made.

The object of this invention is to simplify the design of the cam plates and

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to enable the colour relationship between the various sets to be changed. To this end each set of equipment is provided with its own drum, and the drums are coupled together by means allowing their phase relationship to be changed. Further the pairs of plates in each drum may be relatively adjustable in phase.

Generally the drums will be driven at the same speed. For example each drum may be driven from a common driving shaft through ratchet gearing such as chain and sprocket gear incorporating a free wheel for each drum.

As in the known system there may be a master switch between the drum switches and the contactors by which all the contactors may be switched from the drums to hand operated switches on a suitable board. Such a master switch may be a drum switch with an off position and it may stop the drum motor when switched over to hand control. In practice the hand switches may be pre-set and a change made from the automatic drum switches to the pre-set colour scheme when desired.

As in the known system, to assist in hand control an indicating instrument may be provided showing the intensity of each colour in each set of equipment. Such instruments may consist of a voltmeter across each dimming resistance, its dial being recalibrated to indicate intensity of light. The whole control apparatus can conveniently be mounted on a common board, and the individual parts may be of any desired type.

Dated this 14th day of December, 1932.

SEFTON-JONES, O'DELL &  
STEPHENS,Chartered Patent Agents,  
285, High Holborn, London, W.C.1,  
Agents for the Applicants.

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## PROVISIONAL SPECIFICATION.

No. 35,460, A.D. 1932.

## Improvements in and relating to the Control of Colour Lighting.

We, HOLOPHANE LIMITED, a British company, and ROLLO GILLESPIE WILLIAMS, a British subject, both of Holophane House, Elverton Street, Vincent Square, London, S.W.1, do hereby declare the nature of this invention to be as follows:—

The object of this invention is to enable the range of colours in an automatic colour light changing system in accordance with our co-pending application No. 35,459/32 to be controlled from a particular point, say by the conductor of an orchestra or from the organ console in a concert hall or cinematograph theatre.

A system of colour lighting is already in use in which an automatic cycle of colour changes is produced by the aid of a motor driven drum switch, which through contactors controls motor driven dimmers in turn controlling the supply to colour lighting units. As now used the drum is designed to produce a cycle including the whole spectral range, and for purely decorative purposes or in conjunction with music not having a very definite character this is quite satisfactory. But in the case of a performance or music having a definite character it is desirable, while still having an automatic cycle of changes, to keep the changes within a more limited range, to har-

monise with the performance or music.

To this end an auxiliary drum switch designed to produce a cycle within the desired range is provided and the contactor circuits lead to a switch at the desired control point by which they can be connected either to the normal drum switch or to the auxiliary drum switch. The latter may be independently driven or be driven by gearing such as a chain from the normal drum switch. Since the range of the auxiliary switch is smaller, it may be of smaller diameter and complete its cycle in a shorter period.

It will be understood that there may be more than one auxiliary drum, for instance one producing a range of cold colours, and another a range of warm colours. The control switch will have a corresponding number of positions. Further the parts of the main and auxiliary drum switches belonging to different units may be adjustable in phase with respect to one another as described in our said co-pending application No. 35,459/32.

Dated this 14th day of December, 1932.

SEFTON-JONES, O'DELL &  
STEPHENS,

Chartered Patent Agents,  
285, High Holborn, London, W.C.1,  
Agents for the Applicants.

## COMPLETE SPECIFICATION.

## Improvements in and relating to the Control of Colour Lighting Apparatus.

We, HOLOPHANE LIMITED, a company organised and existing under the laws of Great Britain and Northern Ireland, and ROLLO GILLESPIE WILLIAMS, a British subject, both of Holophane House, Elverton Street, Vincent Square, London, S.W.1, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the control of colour lighting systems. A system is known in which the complete installation, that is to say a number of sets of

equipment each comprising two, three or more colours and each located at a different point, for example to illuminate the ceiling, walls and proscenium cove respectively of a theatre, is controlled by a motor driven drum switch whereby the colour lighting goes through a cycle of predetermined changes during one rotation of the drum, which may take about seven minutes. Each set of equipment comprises lamps with colour filters and in some cases unfiltered lamps as well and the desired colours are obtained by controlling the lamps through dimming resistances.

In the case say of a theatre where large sets of equipment and heavy currents are involved, the dimmers are actuated by reversible electric motors and the motors themselves are controlled by electrically operated contactors, each motor requiring two contactors, one for each direction of rotation. In this case the drum switch comprises a pair of cam plates for each motor which actuate the respective contactors and for the complete installation there will be a large number of plates on the drum, for example, with four three-colour sets of equipment there will be twenty four plates and the sequence of colours, though it can be designed as desired, is definitely fixed once the drum has been made.

The object of this invention is to simplify the design of the cam plates and to enable the colour relationship between the various sets to be changed. To this end each set of equipment is provided with its own drum, and the drums are coupled together by means allowing their phase relationship to be changed. Further the pairs of plates in each drum may be relatively adjustable in phase.

Where a single drum is provided for each set of equipment, it may be designed to produce a cycle including all the primary, secondary and pastel colours in random order, and for purely decorative purposes, or in conjunction with music not having a very definite character, this is quite satisfactory. But in the case of a performance or music having a definite character it is desirable, while still having an automatic cycle of changes, to make the changes follow a more specialized sequence, possibly within a more limited range, to harmonise with the performance of music.

To this end an auxiliary drum switch designed to produce a cycle within the desired range is provided for each set of equipment and the contactor circuits lead to a master switch at the desired control point by which they can be connected either to the normal drum switch or to the auxiliary drum switch. Such master switch may also have an off position and another position in which the contactor lines are connected to hand operated switches on a suitable board. The auxiliary drum switches may be independently driven or be driven by gearing such as a chain from the normal drum switches. Since the range of the auxiliary switches is smaller, they may be of smaller diameter and complete their cycle in a shorter period.

It will be understood that there may be more than one auxiliary drum, for instance one producing a range of cold

colours, and another a range of warm colours. The control switch will have a corresponding number of positions.

Generally corresponding drums will be driven at the same speed. For example each main drum may be driven from a common driving shaft through ratchet gearing such as chain and sprocket gear incorporating a free wheel for each drum, while the auxiliary drums may be chain driven from the main drums.

The accompanying drawing diagrammatically illustrates an example of the invention. To simplify the figure, the main supplies and the return leads of all circuits are omitted. The figure shows the case of an installation having three sets of equipment, each comprising three colours, but it will be understood that both the number of sets of equipment and the number of colours may be varied according to need. The figure further shows two sets of auxiliary drum switches for providing different ranges of colour, but here again the number of auxiliary switches can be varied according to need.

The sets of equipment are respectively marked E1 E2 and E3 and each comprises for example red, green and blue light sources marked R G and B respectively. Each set of equipment is provided with three motor driven dimmers D respectively controlling the red green and blue light sources and respectively marked with suffixes indicating the colour and the number of the set of equipment. These dimmers are in fact motor operated rheostats connected in circuit with a main supply for the various lamps they control. The motors are reversible and each is provided with two contactors respectively marked I and O which when actuated set the motor going in one and the other direction; these references I and O are again given suffixes to indicate the colour and set of equipment controlled.

The supply leads for the contactors are carried to a master switch MS by which they can be connected either to a set of hand switches not shown through lines h, or to the principal and auxiliary drum switches as described more fully below. The master switch may also have an "off" position, and may be remotely controlled.

Each set of equipment has its own principal drum switch DS and two auxiliary drum switches dS suffixes being marked to indicate the set of equipment to which each switch appertains. Each drum switch comprises three pairs of plates P, one pair for each colour and in each pair one for the corresponding contactor I and the other for the corre-

sponding contactor O. The references P are given suffixes to indicate the colour and contactor controlled. The plates are in fact cams controlling the circuits of the contactors through brushes or the like. The set of six plates in any switch DS is designed to produce a desired sequence of colour change covering substantially the whole available range in more or less random order during one revolution of the switch, while the set of six plates in any switch dS is designed to produce a desired more specialized sequence of colour change which may be within a more limited range of colours, during one revolution.

Generally the three drum switches in action together have similar sets of plates, i.e. they will produce the same colour sequence in the respective sets of equipment. The principal drum switches are all driven from an electric motor 1 by means of individual chain drives 2, 3, 4 the driving sprockets 5, 6 and 7 on the motor shaft being free wheels so that one drum switch can be stepped on with respect to the others, i.e. so that though each switch effects the same colour sequence, these sequences can be put out of phase with one another.

The auxiliary drum switches dS are conveniently driven by chains 8—13 from the corresponding principal switches DS and they are then varied in phase relationship when the phase relationship of the principal switches is varied. There may however be additional free wheels introduced into the auxiliary switch drive so that their phase relationship can be independently varied.

Since the range covered by the auxiliary drum switches is generally smaller than that covered by the prin-

cipal switches their diameters may be smaller and they may rotate faster.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Apparatus for the control of colour lighting systems comprising a plurality of associated sets of equipment used simultaneously and controlled by motor driven dimmers with rotary drum switch control in which each set of equipment is provided with its own drum switch.

2. Apparatus according to claim 1 in which each set of equipment is provided with a plurality of alternative drum switches giving different colour sequences, on to any of which the set of equipment can be switched.

3. Apparatus according to claim 1 or claim 2 in which the phase relationship between the various drum switches in action together can be varied.

4. Apparatus according to claim 2 or 3 in which one drum switch or group of drum switches covers substantially the whole colour range available while the other drum switches or groups cover a more limited range or ranges.

5. Apparatus according to claim 3 or 4 in which the drum switches are driven from a single motor through gearing incorporating free wheels.

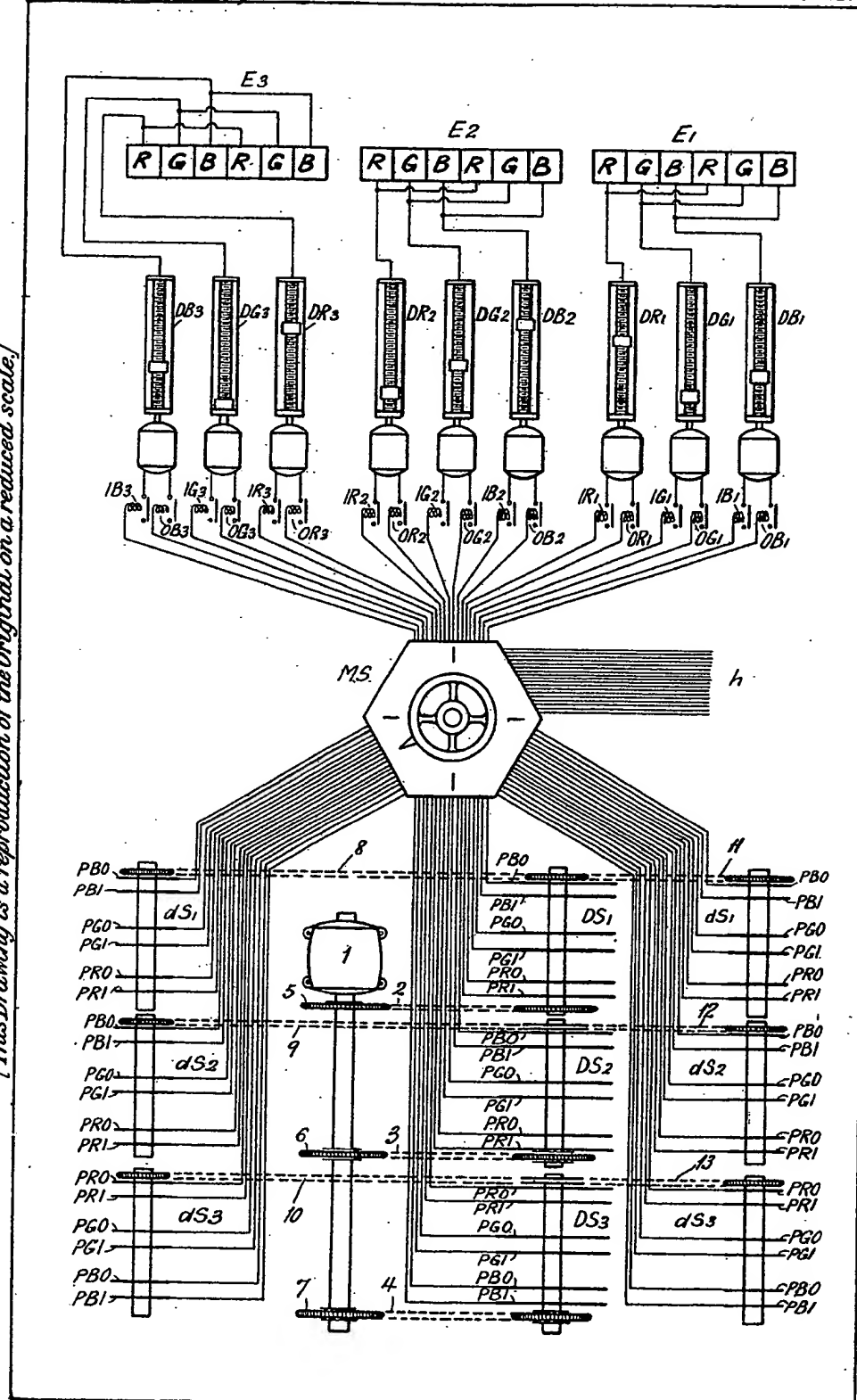
6. Apparatus substantially as described with reference to the accompanying drawings.

Dated this 14th day of December, 1933.

SEFTON-JONES, O'DELL &  
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[This Drawing is a reproduction of the Original on a reduced scale.]



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